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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
LAROSE, COLIN M	
ART UNIT	**PAPER NUMBER**
2623	

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13

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/444,034	PATTIKONDA ET AL.	
	Examiner	Art Unit	
	Colin M. LaRose	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 July 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *7 and 25-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *7,25-27 and 29-39* is/are rejected.

7)☒ Claim(s) *28* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 14 July 2003 has been entered.

Arguments and Amendments

2. Applicants' amendments and arguments filed 14 July 2003, have been entered and made of record. By way of the amendments, claims 1-6 and 8-16 have been canceled. Claims 17-39 have been added. Claims 7 and 17-39 are pending.

Claim Objections

3. The following sections of 37 CFR §1.75(a) and (d)(1) are the basis of the following objection:

> (a) The specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention or discovery.
>
> (d)(1) The claim or claims must conform to the invention as set forth in the remainder of the specification and the terms and phrases used in the claims must find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description.

4. Claims 7, 17-39 are objected to under 37 CFR §1.75(a) and (d)(1) as failing to particularly point out and distinctly claim the subject matter that the applicant regards as the invention.

Regarding claims 17, 22, and 32, the phrases "can be moved" and "may be moved" (claim 1), "may be captured" (claim 22), and "may illuminate" (claim 32) render the claims indefinite. The claims should specify what the invention is, not what it might be or possibly could be.

Regarding claim 25, there is insufficient antecedent basis for "the region".

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 17-20, 25-27, 29, and 39 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,495,337 by Goshorn et al. ("Goshorn").

Regarding claim 25, Goshorn discloses a method of inspecting a structure-bearing surface of an object, said method comprising the steps of:

forming at least one line on the surface of the object using a light emitted at a first wavelength (column 5, lines 54-60: lines 53 formed by projector 20 at some wavelength of light);

moving the line with respect to the surface (column 5, lines 43-50: laser projectors are moved across the surface);

capturing the image of the line as the line moves with respect to the surface (column 5, lines 50-53: camera 23-30 record the reflected beam images); and

determining height information for structures in the region from the image of the line (column 6, lines 9-13: height, H_{SS}, is determined).

Regarding claim 26, Goshorn teaches the line is created by a coherent light source that emits light strobed at a predetermined exposure time (column 5, lines 50-53: laser light is strobed).

Regarding claim 27, Goshorn discloses the at least one line is a plurality of lines formed in a spaced relationship on the surface of the object (figure 2a: beam 53).

Regarding claim 29, Goshorn discloses that the plurality of lines of beam 53 (as shown in figure 2a) form a grid on the surface of the object.

Regarding claim 39, Goshorn discloses determining height information by integrating a series of height measurements to provide an average height (column 13, lines 7-30: a series of height signals are averaged to determine the average height).

Regarding claim 17, Goshorn discloses an optical inspection system (figure 1) for inspecting a structure-bearing surface of an object, said system comprising:

at least one coherent light source (projector 20) that illuminates the surface of the object with a narrow coherent light creating a first line (i.e. coherent lines of light 53), said at least one coherent source being movably mounted (i.e. stage 11 moves via motor 40) such that the first

line created by the at least one coherent light beam can be moved over an area of interest on the surface of the object;

a camera movably mounted (column 4, lines 56-60: cameras 23-30 are included in the stage) above the surface such that the camera may be moved to capture an image of the first line as it moves with respect to the surface being inspected (i.e. cameras 23-30 and beam projectors 20, 22 are mounted on the stage 11, which moves over the surface of the object);

wherein the at least one coherent light source is strobed (column 5, lines 50-53: projector 20 is strobed) at a first predetermined exposure time, thereby controlling exposure time of the camera to the illumination created by the at least one coherent light source (column 12, lines 25-36: lasers are strobed at predetermined intervals, which determines the exposure timing from the cameras 23-30); and

a computer (processors 21A-21H, column 5, lines 22-27) that determines height information for the structure from the captured image of the first line.

Regarding claim 18, Goshorn teaches the coherent light source is a laser (column 5, line 27: "laser beam projectors").

Regarding claim 19, Goshorn discloses a first visible light source (projector 22) for illuminating the surface of the object (with beam 54), wherein the camera captures a first image of the surface when it is illuminated by the first visible light source (column 7, lines 21-25) and the computer determines two-dimensional structure information from the first image (column 7, lines 36-45 and figure 2b: a base distance B_{SR} is calculated by the processors 21A-21H based on at least one of the eight images of the surface containing the reflected beam 54).

Regarding claim 20, Goshorn discloses the first visible light source (projector 22) is operable to strobe (column 5, lines 50-53: projector 22 is strobed) at a second predetermined exposure time, thereby controlling the exposure time of the camera to illumination from the first visible light source (column 12, lines 25-36: lasers are strobed at predetermined intervals, which determines the exposure timing from the cameras 23-30).

Claim Rejections - 35 USC § 103

7. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

8. Claims 21-24 and 30-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goshorn and U.S. Patent 6,064,478 by Paul et al. ("Paul").

Regarding claims 21 and 30, Goshorn discloses illuminating the surface of the object with a visible light (laser 54 from projector 22, figure 1). However, Goshorn is silent to the visible light being at a second wavelength that is different from the first wavelength (for laser 53 from projector 20).

Paul discloses an inspection system (figure 1), which utilizes a plurality of light sources (L1, L2) to inspect an article that is moving with respect to the light sources, similar to that of Goshorn. In particular, Paul discloses that the light sources L1 and L2 are of different colors (i.e. wavelengths). Column 3, lines 51-53.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Goshorn by Paul so that Goshorn's "light" and "visible light" are at different

wavelengths, since Paul teaches that utilizing different wavelengths permits surface defects to be easily recognized as changes in color (column 4, lines 4-8).

Regarding claim 22, Paul discloses the camera (i.e. RGB camera) comprises a first channel for capturing light at the first wavelength (e.g. red) and a second channel for capturing light at a second wavelength (e.g. blue) such that the image of the line as it moves with respect to the surface being inspected and the first image of the surface when it is illuminated by the first visible light source may be captured independently even if the light sources are emitting light at the same time (Pual's RGB camera (figure 1) captures separate images of the red, green, and blue wavelengths of light impinging on the surface of the object at the same time).

Regarding claim 31, Goshorn discloses the image-capturing step includes capturing a second image (e.g. image from camera "C2", figure 3) of the surface illuminated by the visible light (which, per Paul, is at a second wavelength), and wherein the method further comprises the step of determining two-dimensional information for any structures in the region by analyzing the second image (column 7, lines 21-25 and 36-45 and figure 2b: a base distance B_{SR} is calculated by the processors 21A-21H based on the images of the surface containing the reflected beam 54; Goshorn discloses using eight cameras, as shown in figure 3, and the images from all of the cameras are used in determining 2-D information).

Regarding claim 32, Paul discloses performing the image capturing step with a camera operable to capture separate images corresponding to light of the first wavelength (i.e. red) and of the second wavelength (i.e. blue), respectively, such that they may illuminate the surface at the same time (Pual's RGB camera (figure 1) captures separate images of the red, green, and blue wavelengths of light impinging on the surface of the object at the same time).

Regarding claim 33, Goshorn discloses the visible light (which, per Paul, is at a second wavelength) is strobed at a predetermined exposure time (column 5, lines 50-53: projector 22 is strobed).

Reagrding claim 34, Goshorn discloses that the exposure time for the coherent light source (projector 20) and the exposure time for the visible light source (projector 22) are different (column 5, lines 50-53: the projectors are strobed alternately, so that their times of exposure differ).

Regarding claims 23 and 35, the combination of Goshorn and Paul teaches illuminating the surface with light at a third wavelength, the third wavelength being different from the first and second wavelength (Paul, figure 4: three light sources, each emitting different wavelengths of light) wherein the image-capturing step includes capturing a third image (e.g. image from camera "C3", figure 3) created by the visible light at the third wavelength, and determining two-dimensional information for any structures in the region by analyzing the third image (column 7, lines 36-45 and figure 2b: a base distance B_{SR} is calculated by the processors 21A-21H based on the images of the surface containing the third light source; Goshorn discloses using eight cameras, as shown in figure 3, and the images from all of the cameras are used in determining 2-D information).

Regarding claim 24, Paul discloses the camera (figure 1) comprises a third channel for capturing light at a third wavelength (e.g. green).

Regarding claims 36 and 37, the combination of Goshorn and Paul suggests combining the two-dimensional information from each of the images to create refined two-dimensional information, which is combined with the height information to create a profile of the structures

on the surface of the object (the base measurements B (as shown in figure 2 of Goshorn) for each image are combined with each other and the height information to create a profile (volume, area, displacement, etc.); column 7, line 52 though column 8, line 4).

Regarding claim 38, Goshorn discloses the two-dimensional information is combined with the height information to reate a profile of structures on the surface of the object (column 4, lines 9-15: height, volume, x-y translation, geometric shape, etc. are determined for each structure to create a profile of the structure).

9. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Goshorn and Sayag.

Regarding claim 7, although Goshorn is silent to the computer including means for integrating the height information over the length of an exposure to calculate average height, this limitation is a common feature of imaging devices that were known at the time the invention was made.

Sayag provides a general background of the functionality of semiconductor imaging devices, such as CCDs. Sayag teaches that CCDs capture images, inter alia, by accumulating charges during an integration (exposure) period, and the amount of charge accumulated provides a measure of the average radiant energy (column 1, lines 37-40). Therefore, information pertaining to height (e.g. beams 53 impinging on object 12 in figure 1 of Goshorn) is average values due to the integration performed by the CCD during the exposure intervals.

Allowable Subject Matter

10. Claim 28 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and if claim 25 were rewritten to overcome the objection under 37 CFR §1.75.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Colin M. LaRose whose telephone number is (703) 306-3489. The examiner can normally be reached Monday through Thursday from 8:00 to 5:30. The examiner can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au, can be reached on (703) 308-6604. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the TC 2600 Customer Service Office whose telephone number is (703) 306-0377.

CML
Group Art Unit 2623
13 October 2003

SAMIR AHMED
PRIMARY EXAMINER